

This is a revision of Chapter 30 of the "Instructor's Resource Manual for Paramedic Emergency Care," by Richard Cherry, Director of the Paramedic Training Department, Department of Critical Care and Emergency Medicine, SUNY, Syracuse, published by Brady.

The revised content was selected and written by members of the Massachusetts Emergency Medical Services for Children (EMSC) Project Pediatric Resource Group. Questions and comments should be directed to Janet Berkenfield, EMSC Project Director, Mass. Dept of Public Health, (617) 624-5431.

Pediatric Emergencies (Revised February 1998)

LEARNING OBJECTIVES

1. Describe the typical child's emotional response to an emergency.
2. List appropriate developmental milestones for each age group of children and relate the appropriate approach to patient assessment.
3. Discuss the typical parent's response to a pediatric emergency.
4. Describe pediatric patient assessment.
5. Describe the role of non-invasive monitoring in prehospital pediatric emergency care.
6. Describe the concept of Pediatric Advanced Life Support (PALS).
7. Describe the modifications required for pediatric advanced life support, including drug dosage, endotracheal intubation, defibrillation, and IV therapy.

Objectives 1-7 should be considered as basic core objectives: 1 hour 30 min.

For a 3-hour course, the instructor should choose from the following topics to complete the other 1.5 hours.

8. Discuss pediatric trauma emergencies and compare them to trauma emergencies seen in adult patients. **45 min.**
9. Describe the characteristics of the abused child and of the child abuser.
10. Describe signs and symptoms suggestive of child abuse or neglect.
11. List management techniques to use when treating an abused child.

Objectives 9-11: 30 min.

12. Discuss the pathophysiology, assessment and prehospital management of the following pediatric neurological emergencies: seizures, febrile seizures, meningitis. **30 min.**
13. Discuss the pathophysiology, assessment, and prehospital management of the following pediatric respiratory emergencies: aspirated foreign body, croup, epiglottitis, bronchiolitis, asthma, status asthmaticus. **45 min.**
14. Discuss the pathophysiology, assessment, and management of the following pediatric gastrointestinal emergencies: nausea and vomiting, diarrhea. **30 min.**
15. Discuss the pathophysiology, assessment, and prehospital management of the following pediatric cardiovascular emergencies: dehydration, sepsis, dysrhythmias, congenital heart disease. **30 min.**
16. Define Sudden Infant Death Syndrome (SIDS), the theories of etiology, and management in the prehospital setting. **15 min.**

17. Describe the population of children with special health care needs in Massachusetts. What are the major medical conditions these children experience, and how can EMS providers be prepared to care for children assisted by technology living or attending school in their community?
18. Describe some of the equipment these children might be using.
19. Demonstrate an understanding of the unique role played by the parents of children with special health care needs.

Objectives 17-19: 30 min.

20. Discuss the issues of emergency care for children in the school setting. **15 min.**

The first 7 objectives should always be included in any pediatric refresher for paramedics.

If the Instructor prefers to cover all of the above objectives (i.e. # 1-20), a 6-hour format should be used. If the Instructor is limited to, or prefers, a 3-hour format, s(he) can complete all of objectives 8-20 over several repetitions of the refresher course.

Teaching Outline	Notes
<p>General Approach to Pediatric Emergencies</p> <ul style="list-style-type: none"> • Varies with the age and nature of incident • Quick and specific questioning of the child • Key on your visual assessment; begin your examination without instruments • Approach the child slowly and gently • Do not separate the child from the mother unnecessarily • Be honest and allow the child to determine the order of the examination • Avoid touching painful areas until confidence has been achieved <p><u>The Child's Response to Emergencies</u></p> <ul style="list-style-type: none"> • Fear of being separated from parents • Fear of being removed from home • Fear of being hurt • Fear of mutilation • Fear of the unknown <p><u>General Guidelines</u></p> <ul style="list-style-type: none"> • Be honest with children • Tell them it will hurt, if it will • Use appropriate language 	

Teaching Outline	Notes
<p>Developmental Stages - A Key to Assessment</p> <p><u>Neonatal Stage</u></p> <ul style="list-style-type: none"> • Birth to 1 month • Congenital problems and other illnesses often noted • Personality development begins • Stares at faces and smiles • Easily comforted by mother and sometimes father • Rarely febrile. If so, be cautious of meningitis • Approach <ul style="list-style-type: none"> -Keep child warm -Observe skin color, tone, respiratory activity -Absence of tears when crying indicates dehydration -Auscultate the lungs early when the child is quiet -Have the child suck on a pacifier -Have the child remain in the mother's lap <p><u>Ages 1-5 Months</u></p> <ul style="list-style-type: none"> • Birth weight doubles • Can follow movements with their eyes • Muscle control develops • History must be obtained from parents • Common illnesses <ul style="list-style-type: none"> -SIDS -Vomiting and diarrhea/dehydration -Meningitis -Child Abuse -Household injuries • Approach <ul style="list-style-type: none"> -Keep child warm and comfortable -Have child remain in mother's lap -Use a pacifier or bottle <p><u>Ages 6-12 Months</u></p> <ul style="list-style-type: none"> • Ability to stand or walk with assistance • Very active and explore their world with their mouths • Stranger anxiety • They do not like lying supine • They cling to their mothers • Common illnesses <ul style="list-style-type: none"> -Febrile seizures -Vomiting and diarrhea/dehydration -Bronchiolitis or croup -Auto-related injuries and falls -Child abuse -Ingestions and foreign body obstructions -Meningitis • Approach <ul style="list-style-type: none"> -Examine the child in the mother's lap -Progress from toe to head -Allow the child to get used to you 	<p>Teaching Tip</p> <p><i>Not all of your students feel comfortable around small children. Arrange for those who have no children of their own to spend time at a local day care center, just to be around kids of all ages. Another way is to have a lab where children of all age groups come and have their vital signs taken by the students.</i></p>

Teaching Outline	Notes
<p>Developmental Stages (cont.)</p> <p><u>Ages 1-3 Years</u></p> <ul style="list-style-type: none"> • Motor development, always on the move • Language development • Child begins to stray from mother • Child can be asked certain questions • Injuries prevail • Common problems <ul style="list-style-type: none"> -Auto-related injuries -Vomiting and diarrhea -Febrile seizures -Croup, meningitis -Foreign bodies • Cautious approach to gain confidence • Child may resist physical exam • Avoid “no” answers • Tell the child if something will hurt <p><u>Ages 3-5 Years</u></p> <ul style="list-style-type: none"> • Tremendous increase in motor development • Language is almost perfect but may not wish to talk • Afraid of monsters, strangers, fear of mutilation • Look to parent for comfort and protection • Common problems <ul style="list-style-type: none"> -Croup, asthma, epiglottitis -Ingestions, foreign bodies -Auto-related injuries, burns -Child abuse -Drowning -Meningitis, febrile seizures • Interview child first, then have parents fill in gaps • Use a doll or stuffed animal to assist in assessment • Allow the child to hold and use equipment • Allow them to sit on your lap • Always explain what you are going to do <p><u>Ages 6-12 Years</u></p> <ul style="list-style-type: none"> • Active and carefree • Great growth, clumsiness, personality changes • Strive for their parents’ attention • Common problems <ul style="list-style-type: none"> -Drowning -Auto and bicycle-related injuries -Fractures, falls, sports injuries • Interview the child first • Be honest, protect their privacy and tell them what is wrong • They may cover up information if they were disobeying 	<p style="text-align: center;">Teaching Tip</p> <p><i>Using the popular cartoon “Calvin and Hobbs” is a fun way to illustrate the fear of monsters common to this age group.</i></p>

Teaching Outline	Notes
<p>Developmental Stages (cont.)</p> <p><u>Ages 12-15 Years</u></p> <ul style="list-style-type: none"> • Varied development • Concerned with body image and very independent • Peers are most important • Common problems <ul style="list-style-type: none"> -Mononucleosis -Auto-related injuries, sports injuries -Asthma -Drug and alcohol abuse -Sexual abuse, pregnancy -Suicide gestures • Interview child away from the parent • Pay attention to what they are not saying 	
<p>The Parents' Response to Emergencies</p> <ul style="list-style-type: none"> • Expect a grief reaction • Initial guilt, fear, anger, denial, shock, loss of control <p><u>Parent Management</u></p> <ul style="list-style-type: none"> • Tell them your name and qualifications • Acknowledge their fears and concerns • Reassure them it is all right to feel as they do • Redirect their energies to help you care for the child • Remain calm and in control • Keep them informed as to what you are doing • Don't "talk down" to parents • Assure parents that everything is being done 	

Teaching Outline	Notes
<p>General Approach to Pediatric Assessment</p> <p><u>History</u></p> <ul style="list-style-type: none"> • Be direct and specific with child • Focus on observed behavior • Focus on what child and parents say • Approach child gently, encourage cooperation • Get down to visual level of child • Use a soft voice and simple words <p><u>Physical Exam</u></p> <ul style="list-style-type: none"> • Assess patency of airway • Respirations <ul style="list-style-type: none"> -Observe the rate and pattern before the child starts crying -Is rate too slow or too fast? -Look for retractions, nasal flaring, paradoxical chest movement, grunting, and head bobbing • Pulse <ul style="list-style-type: none"> -Brachial, carotid, or radial depending on child -Monitor for 30 seconds -Compare central and peripheral pulses -Assess capillary refill • Blood pressure <ul style="list-style-type: none"> -Use the right size cuff • Brief neurological assessment <ul style="list-style-type: none"> -Mental status, interaction with known caretakers -Pupils: size and shape • Focused Physical Assessment • Non-Invasive Monitoring <ul style="list-style-type: none"> -Pulse oximetry -ECG monitoring -Automated blood pressure devices 	

Developmental Anatomy and Physiology as Related to Critical Assessment

Organ System	Characteristic	Significance
Airway	Small mouth, large tongue	Tongue easily causes airway obstruction; control of tongue during intubation may be difficult.
	Small caliber of upper airway	Small changes in radius cause large increases in resistance.
	Larynx higher in neck and more anterior	“Sniffing” position is ideal position for visualizing cords. If neck is hyperextended, cords can’t be seen.
	Narrowest portion of trachea is below the cords at the cricoid ring	Do not use cuffed tubes in children under 8 years.
	Epiglottis is “U” shaped and extends into pharynx	Use a straight blade to directly control the epiglottis during intubation.
Cervical Spine	Wedge-shaped vertebrae	Greater mobility
	Fulcrum of neck motion is higher (C5-6)	Injuries occur higher in C-spine (C1,2,3)
	Head is heavier	Greater stress on spinal cord in flexion-extension injuries
	Neck muscles not well developed	Greater risk for injury
Chest and Lungs	Compliant chest wall	Collapses with efforts to increase tidal volume, increasing the work of breathing
	Less alveolar surface area	Less area for gas exchange, less respiratory reserve
	Less glycogen stores in diaphragm	More prone to diaphragmatic fatigue
	Higher metabolic rate increases oxygen requirement	Increased minute ventilation to meet O ₂ requirement results in lower pCO ₂ .
	No hypoxic drive	Infant becomes apneic in response to hypoxia.
	Small caliber of intrathoracic airways	Small decrease in radius results in much greater increase in resistance to flow (e.g. wheezing in bronchiolitis).

Developmental Anatomy and Physiology (cont.)

Organ System	Characteristic	Significance
Cardiovascular	<p>Infant cannot increase stroke volume.</p> <p>Ability to peripherally vasoconstrict</p>	<p>Increase in cardiac output is achieved by increasing heart rate.</p> <p>Can maintain BP despite significant volume loss; decrease in BP is late sign of shock</p>
Abdomen	<p>Abdominal wall less muscular</p> <p>Internal organs larger in relation to size of abdominal cavity</p>	<p>Internal organs less protected</p> <p>More susceptible to internal organ injury with blunt trauma</p>
Extremities	<p>Bones are more compliant</p> <p>Growth plates</p>	<p>Different fracture types</p> <p>Fractures, not sprains</p>

Teaching Outline	Notes
<p>Pediatric Advanced Life Support</p> <p><u>Anticipating cardiopulmonary arrest</u></p> <ul style="list-style-type: none"> • Normally not a sudden event • Progressive deterioration of cardiorespiratory function • Goal is to recognize and prevent arrest • Recognition by physical exam alone • Rapid cardiopulmonary assessment for: <ul style="list-style-type: none"> -Respiratory rate > 60 -Heart rate > 180 or < 80 (under 5 years) > 160 (over 5 years) -Respiratory distress, cyanosis -Trauma, burns -Altered level of consciousness -Seizures -Fever with petechiae <p><u>Rapid cardiopulmonary assessment</u></p> <ul style="list-style-type: none"> • Airway patency • Breathing <ul style="list-style-type: none"> -Rate Fast rates will tire Slow rates are ominous -Air entry Observe chest rise, breath sounds, stridor, wheezing -Mechanics Nasal flaring, accessory muscle use -Color Cyanosis is a late sign Peripheral cyanosis (toes) vs. central cyanosis (lips) -Pattern Irregular breathing, long pauses associated with cyanosis or bradycardia or effortless deep breathing • Circulation <ul style="list-style-type: none"> -Heart rate Tachycardia means arrest Bradycardia means impending arrest -BP Hypotension is a late sign Mild hypotension should be vigorously treated -Peripheral Presence of peripheral pulses Pulse pressure narrows as shock develops Loss of central pulses is an ominous sign Capillary refill >2 sec = poor perfusion -End-organ perfusion <ul style="list-style-type: none"> Changes in mental status, such as lethargy, inappropriate response to strangers, pain, or failure to recognize strangers indicates poor cerebral perfusion Urine output less than 1 ml/kg/hr indicates poor renal perfusion. Ask about number of diapers. 	

Teaching Outline	Notes
<p>Management of the Critically Ill Infant or Child</p> <p><u>Basic Life Support</u></p> <p><u>Pediatric Airway Management</u></p> <ul style="list-style-type: none"> Anatomical differences <ul style="list-style-type: none"> -Larynx higher in the neck -Vocal cords are short and concave -Cricoid ring is narrowest part -Tongue is larger Endotracheal intubation considerations <ul style="list-style-type: none"> -More difficult to visualize the vocal cords -Size of tube is based on size of cricoid ring -Use uncuffed tubes -Monitor for dysrhythmias during attempt -Straight blade recommended Other considerations <ul style="list-style-type: none"> -Avoid EOA, PTL, ETC airways -Avoid nasotracheal airways Bag valve mask with no pop-off valve Avoid demand valve resuscitators <p><u>Vascular Access and Fluid Therapy</u></p> <ul style="list-style-type: none"> IV techniques same as adults Scalp veins often used Normal saline or lactated Ringer's Intraosseous infusion <ul style="list-style-type: none"> -Comatose child under 5 years old -See skill sheet 30-1 Fluid bolus <ul style="list-style-type: none"> -20 ml/kg over 10-20 minutes, repeated prn -Reassess child <p><u>Medications</u></p> <ul style="list-style-type: none"> Correct hypoxia (oxygen) Increase perfusion pressure during chest compressions and stimulate more forceful cardiac compressions (epinephrine 0.01 mg/kg) Accelerate the heart rate (atropine 0.02 mg/kg) Correct metabolic acidosis (Bicarbonate 1 mg/kg) Suppress ventricular ectopy (lidocaine 1 mg/kg) <p><u>Electrical Therapy</u></p> <ul style="list-style-type: none"> Initial defibrillation dose is 2 joules/kg All subsequent shocks at 4 joules/kg 	<p><i>Emphasize</i></p> <p><i>Children are able to maintain normal blood pressure until they finally drop it suddenly.</i></p> <p><i>Handouts</i></p> <p><i>Stroup, CA: "Intraosseous Infusion," JEMS, May 1987.</i></p> <p><i>Points of Interest</i></p> <p><i>The best outcomes from cardiac arrest in infants occur if:</i></p> <ol style="list-style-type: none"> <i>1) Respiratory arrest only</i> <i>2) CPR is performed for less than 3-4 minutes</i> <i>3) Less than one or two epi's have been administered</i> <i>4) Less than 20 minutes in arrest</i> <p><i>Videos</i></p> <p><i>Washington EMS for Children, "Intraosseous Infusions"</i></p> <p><i>Emergency Medical Update - Intraosseous Infusions, Feb. 1991</i></p>

Teaching Outline	Notes
<p>Pediatric Trauma Emergencies</p> <p><u>Background</u></p> <p>Head, face, and neck injuries</p> <ul style="list-style-type: none"> • Children prone to head injuries • Be alert for signs of child abuse • Facial injuries common secondary to falls • Always assume a spinal injury with head injury <p>Chest injuries</p> <ul style="list-style-type: none"> • Isolated injuries uncommon; usually associated with abdominal injuries <p>Abdominal injuries</p> <ul style="list-style-type: none"> • Second most common cause of pediatric trauma deaths • Most result of blunt trauma • Liver and spleen are most commonly injured organ • Treat aggressively for shock in blunt abdominal injury <p>Extremity injuries</p> <ul style="list-style-type: none"> • Usually limited to fractures and lacerations • Most fractures are incomplete • Watch for growth plate injuries <p>Burns</p> <ul style="list-style-type: none"> • Second leading cause of pediatric deaths • Scald burns are most common • Rule of nine is different for children <p><u>Assessment & Management</u></p> <ul style="list-style-type: none"> • ABC's - including vascular access (2 large-bore short peripheral IVs) • Initial management of head, chest, abdomen and extremities injuries and how it relates to the ABCs • Keep child warm • Keep parents and child together as much as possible 	<p><i>Emphasize</i></p> <p><i>C-spine precautions in neutral position to maintain adequate airway protection.</i></p> <p><i>Predictable injury pattern based on mechanism, e.g. Waddell's Triad with pediatric vs. car.</i></p> <p><i>Assess airway and adequacy of ventilation</i></p> <p><i>Symptoms of spleen and liver injuries can appear hours after initial injury. A good history is important.</i></p> <p><i>Splint femur fractures (large amount of blood loss can occur from a femur fracture).</i></p> <p><i>Parents can provide comfort for their child and provide information regarding the history of the injury.</i></p> <p><i>* A child that does not recognize parents or is not easily comforted by the parents has signs of a head injury.</i></p> <p><i>Reference:</i></p> <p><i>Eichelberger, "Pediatric Emergencies, "Chapter 9</i></p>

Teaching Outline	Notes
<p>Child Abuse and Neglect</p> <p><u>Background</u></p> <ul style="list-style-type: none"> • Be aware of your state law and your responsibilities as a mandated reporter • Those at greater risk <ul style="list-style-type: none"> -Premature or twin infants -Child with special needs -Uncommunicative child • Characteristics of some abusive parents: <ul style="list-style-type: none"> -Low self esteem -Social isolation -Parent-child role reversal -Childhood history of abuse -Abnormal psychological reactivity -External locus of control -Substance abuse -Physical or psychoneurologic health problems • Sexual abuse <ul style="list-style-type: none"> -Short, focused history to assess extent of injuries and safety of environment -Can occur at any age -Perpetrator is usually in a position of authority over the child -The sexual activity has usually progressed over time -Avoid touching the child or disturbing the clothing -Examine genitalia only if serious injury is suspected (i.e. active bleeding) -Maintain the chain of evidence -Provide caring support <p><u>Assessment</u></p> <ul style="list-style-type: none"> • Signs of potential child abuse <ul style="list-style-type: none"> -Long bone fractures in a child not yet walking -Injuries in different stages of healing -Suspected abdominal injury in a young child, with inadequate history -Burns or bruises in recognizable patterns -Injuries inconsistent with assessment findings -Increased intracranial pressure/Shaken Baby Syndrome -Parent's history of events surrounding the injury changes during the interview -Delay in seeking medical care -Inappropriate response to severity of injury -Parent denies any knowledge of possible mechanism of injury -Previous involvement with child protective services 	<p>Resources</p> <p><i>Light, J. and Conner, L., "Child Abuse Calls," Emergency, 27(8):30-35, 1995.</i></p> <p><i>Beckerman, B., "Child Abuse... Answers to and Discussion of the Test Questions Presented in the March Case Review," Emergency Medical Services, 22(4):82-3, April 1993.</i></p> <p><i>Pike, K.M., "When a Child Cries: the EMT's Role in the Determination and Treatment of Child Abuse," Emergency, 25(9):39-41, September 1993.</i></p>

Teaching Outline	Notes
<p>Child Abuse and Neglect (cont.)</p> <p><u>Assessment (cont.)</u></p> <ul style="list-style-type: none"> • Signs of potential child neglect <ul style="list-style-type: none"> -Malnutrition without physical cause -Unsanitary or unsafe housing -Unattended medical or dental problems -Poor hygiene -Inappropriate clothing for the weather -Abandonment -Lack of supervision -Educational neglect (frequent absences) • Indicators of Munchausen Syndrome by Proxy <ul style="list-style-type: none"> -Recurrent illnesses with no identified cause -Unusual symptoms that don't make clinical sense -Symptoms that are only observed by parent -Frequent visits to various hospitals with normal findings -Presence of drugs that induced symptoms in a toxic screen -Discrepancies between history and physical findings -Numerous hospitalizations at different hospitals -Perpetrator is usually the mother who has some allied health training <p><u>Management</u></p> <ul style="list-style-type: none"> • Assess and maintain airway, breathing, and circulation • Assess potential disability • Perform secondary survey • Treat all injuries appropriately • Protect the child from further abuse • Notify the proper authorities; be familiar with your state reporting laws • Be objective, supportive and non-judgmental toward the parents • Transport the child to an appropriate emergency facility and give a complete report to the receiving care provider 	

Teaching Outline	Notes
<p>Pediatric Seizures</p> <p><u>Background</u> Pediatric seizures can be either symptomatic of an underlying problem or idiopathic in origin. Seizures may be associated with the following conditions:</p> <ul style="list-style-type: none"> • Fever • Idiopathic epilepsy • Electrolyte disturbances • Head trauma • Hypoglycemia • Toxic ingestions or exposure • Birth injury • CNS malformations • Sepsis • Neoplasms • Hypoxic-ischemic injury • Post trauma <p>Status Epilepticus is seizure activity lasting longer than 30 minutes without recovery or when 3 or more seizures have occurred without wakening. It is considered a medical emergency.</p> <p>Simple febrile seizures occur in children 6 months to 5 years of age and result from a sudden increase in body temperature. They are brief, generalized seizures and never last more than approximately 20 minutes. They are usually related to a recent onset of URI symptoms or fever.</p> <p><u>Pathophysiology</u> Seizures are paroxysmal electrical discharges of neurons in the brain resulting in alteration of function or behavior (APLS). They may be partial (focal) or generalized. Complications include cerebral damage secondary to hypoxia, arrhythmias, or cardiac arrest.</p> <p><u>Assessment</u></p> <ul style="list-style-type: none"> • Assess ABCs • Assess LOC • Vital signs with temperature • Describe nature of seizures (focal vs. generalized) • Any PMH of seizures, recent trauma, acute illness including diarrhea and/or vomiting • Does child take seizure medication? Amount and time of last dose • Identify patient with status epilepticus 	<p>Resources</p> <p><i>APLS (Hopkins), Practical Guide to Pediatric Intensive Care, 3rd ed. (Blumer)</i></p>

Teaching Outline	Notes
<p><u>Management</u></p> <ul style="list-style-type: none"> • Establish access • Manage the ABCs • Protect from further injury • Administer medications, as per medical control • Monitor ABCs with drug administration • Correct hypoglycemia • Transport to ED • D-stick • Initiate ALS standing orders 	<p><i>Handout</i></p> <p><i>Crabb, T.J., "In the Hot Seat: Managing Febrile Seizures," JEMS, January, 1993</i></p> <p>Drugs</p> <p>Dextrose: 10% .5 gm/kg IV bolus</p>

Teaching Outline	Notes
<p>Meningitis</p> <p><u>Background</u></p> <ul style="list-style-type: none"> • Infection of the meninges • Can result from virus or bacteria • More common in children • Infection can be fatal if not recognized and treated <p><u>Assessment</u></p> <ul style="list-style-type: none"> • Child may appear very ill • History of recent illness • High fever, lethargy, irritability • Bulging fontanelles in infants <p><u>Management</u></p> <ul style="list-style-type: none"> • ABCs • Assess for compensated shock or shock, and treat with IV fluids, 20cc/kg bolus • Mask for paramedics exposed for any suspected cases 	<p><i>Emphasize</i></p> <p><i>A child that cannot be consoled by parent and has a high-pitched cry is showing signs of irritation of the meninges.</i></p> <p><i>Handout</i></p> <p><i>Signs and Symptoms of Meningitis by Age</i></p>

Teaching Outline	Notes
<p>Sepsis</p> <p><u>Background & Pathophysiology</u></p> <ul style="list-style-type: none"> • Life-threatening bacterial infection of the bloodstream • Neonates highly susceptible to sepsis • Toxins released into bloodstream <p><u>Assessment</u></p> <ul style="list-style-type: none"> • Ill appearing child • Irritability or altered mental status • Fever • Vomiting and diarrhea • Cyanosis, pallor, mottled skin • Poor feeding • Petechiae <p><u>Management</u></p> <ul style="list-style-type: none"> • Support airway, breathing, circulation (ABCs) • Evaluate and treat signs of septic shock, IV fluids 20cc/kg • Initiate ALS protocols for pediatric shock • Contact medical control for additional medications (e.g. vasopressors) 	<p><i>Emphasize</i></p> <p>* <i>Septic shock</i></p> <p><i>Very ill appearance</i></p> <p><i>Altered mental status</i></p> <p><i>Tachycardia</i></p> <p><i>Capillary refill time > 2 seconds</i></p> <p><i>Hyperventilation leading to respiratory failure</i></p> <p><i>Cool and clammy skin</i></p> <p><i>Inability of child to recognize parents</i></p>

Teaching Outline	Notes
<p>Aspirated Foreign Body</p> <p><u>Background</u></p> <ul style="list-style-type: none"> • Usually the 1-5 year old age group • These kids put everything into their mouths • Accompanied by running or falling • Inadequate chewing capabilities • Common items: gum, hot dogs, peanuts, balloons, hard candy, small toys, jewelry <p><u>Pathophysiology</u></p> <ul style="list-style-type: none"> • Object may act as one-way valve allowing air in but not out • Partial obstruction is most effectively cleared by the patient's own mechanism • Object can be aspirated directly into lungs without upper airway obstruction <p><u>Assessment</u></p> <ul style="list-style-type: none"> • Complete obstruction will present as apnea • Partial obstruction may present as labored breathing, retractions, and cyanosis, stridor, apprehension, drooling • Signs of decompensated partial obstruction <ul style="list-style-type: none"> -Cyanosis -Bradycardia -Fatigue <p><u>Management of Complete Obstruction & Partial Decompensated Obstruction</u></p> <ul style="list-style-type: none"> • Attempt to clear airway with BLS techniques • Attempt removal with direct laryngoscopy and Magill forceps • Intubation; if necessary, needle cricothyrotomy • Management of partial obstruction <ul style="list-style-type: none"> -Make child comfortable -Administer humidified oxygen -Encourage child to cough -Have intubation equipment available -Transport to hospital for removal with bronchoscopy 	<p><i>Points of Interest</i></p> <p><i>90% of all deaths due to foreign body aspiration occur in patients < 5 years of age; 65% of these are infants.</i></p> <p><i>Emphasize</i></p> <p><i>Suspect FBO in all cases of sudden onset of respiratory distress with associated stridor, gagging, or coughing.</i></p>

Teaching Outline	Notes
<p>Croup</p> <p><u>Background</u></p> <ul style="list-style-type: none"> • Laryngotracheobronchitis • Viral infection of the upper airway • Occurs in ages 6 months to 4 years • More prevalent in fall and winter <p><u>Pathophysiology</u></p> <ul style="list-style-type: none"> • Edema develops, narrowing the airway lumen • Narrowing is subglottic • Severe cases may result in complete obstruction <p><u>Assessment</u></p> <ul style="list-style-type: none"> • Harsh, barking cough develops • Inspiratory stridor • Position of comfort is sitting • Nasal flaring, tracheal tugging, retractions • Never use a tongue depressor to examine the throat <p><u>Management</u></p> <ul style="list-style-type: none"> • Place child in position of comfort • Administer humidified oxygen • Administer nebulized epinephrine if severe attack 	

Teaching Outline	Notes
<p>Epiglottitis</p> <p><u>Background</u></p> <ul style="list-style-type: none"> Bacterial infection largely prevented by Hib vaccine Used to occur in toddler and early school-age group; now occurs more often in adolescents and young adults <p><u>Pathophysiology</u></p> <ul style="list-style-type: none"> Soft tissue, supraglottic infection Resembles symptoms of upper airway obstruction <p><u>Assessment</u></p> <ul style="list-style-type: none"> Sudden onset of symptoms with high fever Child is drooling Suprasternal retractions, shallow breathing, dyspnea, inspiratory stridor Never try to use a tongue depressor to visualize the throat <p><u>Management</u></p> <ul style="list-style-type: none"> Position of comfort is sitting forward Administer humidified oxygen If total obstruction occurs, ventilate with high pressure Have intubation equipment available Transtracheal ventilation may be required 	<p>Emphasize</p> <p><i>Since obstruction is supraglottic and involves soft tissue, positive pressure ventilation with Bag-Valve Mask is often successful.</i></p>
<p>Bronchiolitis</p> <p><u>Background</u></p> <ul style="list-style-type: none"> Respiratory infection of the lower airways caused by Respiratory Syncytial Virus (RSV) Occurs in infancy <p><u>Pathophysiology</u></p> <ul style="list-style-type: none"> Lower airway obstruction is caused by smooth muscle constriction, lining edema, mucous production, and sloughing of cells from lining. Compensatory mechanisms may increase the work of breathing, leading to fatigue (cross-reference/dev.anat.) <p><u>Assessment</u></p> <ul style="list-style-type: none"> Copious nasal secretions Cough, tachypnea, retractions Expiratory wheezes and inspiratory rales <p><u>Management</u></p> <ul style="list-style-type: none"> Place in position of comfort Administer humidified oxygen by mask Treat bronchospasm with albuterol Support ventilations as necessary 	<p>Videos</p> <p>* Washington EMSC, R. Ward, "To Breathe, To Live."</p> <p>* Washington EMSC, "Respiratory Distress in Infants and Children."</p> <p>* Emergency Medical Update: Pediatric Respiratory Emergencies, Jan. 1990</p> <p>Emphasize</p> <p><i>Observation of degree of respiratory distress and respiratory pattern may be the best indicator of lower airway obstruction. The expiratory phase of respiration will be greater or equal to the inspiratory phase. Remember: Once the child is crying, you will not be able to assess lung findings in expiration.</i></p>

Teaching Outline	Notes
<p>Gastrointestinal Emergencies</p> <p><u>Background</u></p> <ul style="list-style-type: none"> • Serious gastrointestinal bleeding occurs infrequently in otherwise healthy children. • Causes of abdominal pain that are not primarily gastrointestinal in origin include strep pharyngitis, urinary tract infections and basilar pneumonia. • Vomiting, particularly without diarrhea, can be caused by increased intracranial pressure, strep pharyngitis, coughing or urinary tract infections. <p><u>Pathophysiology</u></p> <ul style="list-style-type: none"> • Bowel obstruction, which can be manifested by vomiting and abdominal pain, can cause significant hypovolemia as a result of loss of fluid into the obstructed loop of bowel. • Bowel obstruction can interfere with the blood supply to the intestines resulting in infarction of the bowel. • Catastrophic small bowel obstruction can occur secondary to volvulus. In this situation the bowel is floating in the abdominal cavity rather than being anchored to the abdominal wall in a condition known as malrotation. Any child with bilious vomiting and abdominal pain may have a malrotation with volvulus. • Bilious vomiting in the newborn is a surgical emergency. <p><u>Assessment</u></p> <ul style="list-style-type: none"> • Identify by history the child with gastrointestinal bleeding (vomiting blood or coffee grounds, blood per rectum) or possible obstruction (bilious vomiting, abdominal pain). • Assess volume status by heart rate, quality of pulses, capillary refill, extremity temperature, mental status, urine output. • Identify the child who requires fluid resuscitation: <ul style="list-style-type: none"> - tachycardia - capillary refill > 2 seconds - thready distal pulse - lethargy - poor urine output <p><u>Management</u></p> <ul style="list-style-type: none"> • Establish vascular access as needed. • IV fluid, normal saline, 20 cc/kg bolus infused rapidly over 10-15 minutes. • Reassess heart rate, pulses, capillary refill, mental status and determine the need for additional fluid. 	

Teaching Outline	Notes
<p>Dehydration</p> <p><u>Background</u></p> <ul style="list-style-type: none"> • Can occur more rapidly in children who have a higher percentage of body water. • There are multiple etiologies for the fluid loss which results in dehydration: <ul style="list-style-type: none"> - diarrhea and/or vomiting - fever - inadequate oral intake, which may be due to vomiting, respiratory distress - osmotic diuresis, usually secondary to hyperglycemia in diabetic ketoacidosis - burns <p><u>Pathophysiology</u></p> <ul style="list-style-type: none"> • Dehydration results in decreased intravascular volume and therefore poor cardiac output and inadequate perfusion of vital end organs. • Children respond to decreased cardiac output primarily by increasing heart rate (rather than stroke volume). Tachycardia is therefore a very sensitive sign of significant dehydration. • Decreased peripheral pulses occur with peripheral vasoconstriction designed to shunt blood toward more essential organs (heart, brain, kidneys). • Other symptoms of severe dehydration are the result of inadequate perfusion of end organs: <ul style="list-style-type: none"> - skin: poor capillary refill, decreased temperature - brain: lethargy - kidneys: decreased urine output • Fever and tachypnea significantly increase fluid requirements. <p><u>Assessment</u></p> <ul style="list-style-type: none"> • Determine sources of fluid loss by history. • Using the signs noted above, assess the child's volume status. <p><u>Management</u></p> <ul style="list-style-type: none"> • If any of the abnormalities noted above are present (tachycardia, poor distal pulses, prolonged capillary refill, lethargy), establish vascular access. • IV fluid, normal saline. Give 20 cc/kg over 10-15 min. • Reassess heart rate, distal pulses, capillary refill and mental status and determine the need for additional fluid. 	

Teaching Outline	Notes
<p>Cardiovascular Emergencies</p> <p><u>Background</u> The child with a cardiac emergency can present with a variety of signs and symptoms reflecting hypoxia, heart failure, poor cardiac output. The most common dysrhythmia in children is bradycardia. Congenital heart disease (CHD) includes a variety of structural cardiac defects that present at birth, or shortly after, and are the primary cause of heart disease in children.</p> <p>Other causes of cardiovascular dysfunction may be due to:</p> <ul style="list-style-type: none"> -drug toxicity -ingestion -blunt trauma -increased ICP <p><u>Pathophysiology</u></p> <ul style="list-style-type: none"> • Dysrhythmias are usually considered as either stable or unstable, fast or slow. • Bradycardia in unstable patients is usually due to hypoxemia and acidosis related to severe respiratory failure, hypothermia, or increased ICP from head trauma. • Tachyarrhythmias, >180-190 in the unstable patient is due to SVT or VT. The rate of SVT is >220. • V-Fib is extremely rare in children. • Sinus Tachycardia in the <i>stable</i> child is not considered a tachyarrhythmia and may be related to hyperthermia, hypovolemia. • Sinus Bradyarrhythmia in the <i>stable</i> child may be related to underlying cardiac disease, surgery, or cardiovascular fitness. <p><u>Assessment</u></p> <ul style="list-style-type: none"> • Evaluate ABCs • Note heart rate and rhythm • Assess color and perfusion • Assess temperature • Assess lung sounds for wheezing, rales • Assess mental status • What medications are taken? • ? PMH for CHD or recent cardiac surgery • Ingestions • Evaluate recent I's and O's 	<p>Resources <i>APLS (Hopkins)</i></p>

Teaching Outline	Notes
<p><u>Management</u></p> <ul style="list-style-type: none"> • ABCs, supplemental O₂ • Establish IV access • Bradyarrhythmias (unstable): <ul style="list-style-type: none"> -Ensure adequate ventilation and oxygenation -Warm patient -CPR (if HR < 60 in infant or child) -Initiate ALS standing orders -Contact medical control for additional orders • SVT or VT with pulse: <ul style="list-style-type: none"> -Initiate ALS standing orders -Contact medical control for: <ol style="list-style-type: none"> 1) additional fluid boluses 2) synchronized cardioversion 3) adenosine • Ventricular fibrillation or pulseless VT: <ul style="list-style-type: none"> -Initiate ALS standing orders -Contact medical control for additional fluid boluses, sodium bicarbonate 	

Teaching Outline	Notes
<p>Sudden Infant Death Syndrome</p> <p><u>Background</u></p> <ul style="list-style-type: none"> Occurs during first year of life, with a peak at 2-4 months, especially in babies with low birth weights Etiology is unknown - confirmation of SIDS is by autopsy Causes 1.2 deaths per 1,000 births in US Death occurs during sleep Higher incidence during winter months Higher incidence in crowded living conditions Recent reduction in frequency, due to recommendations of position change for sleeping infants and increased frequency of full post mortem exams including death scene investigation <p><u>Assessment</u></p> <ul style="list-style-type: none"> Cardiorespiratory arrest occurs during sleep Normal state of nutrition and hydration Mottled, pooled skin Frothy, pink fluids around mouth and nose Occasionally emesis present Scene survey can provide critical information for future use <p><u>Management</u></p> <ul style="list-style-type: none"> Initiate PALS guidelines for establishment of airway, providing artificial breathing and supporting artificial circulation Assign one person, when possible, to explain procedures to parents Encourage parents to see their baby If death is pronounced in the field, notify the medical examiner Notify your local (or the national) SIDS Center, so they can assist the parents and provide follow up grief counseling 	<p>Videos</p> <p><i>"First Responders to SIDS: You Make a Difference."</i> Saddleback College, Media Production, Irvine, CA, 1992 (38 min.)</p> <p><i>"SIDS: A Special Report."</i> Princeton, NJ, Films for the Humanities and Sciences; a production of the Idea Factory, 1997.</p> <p>Other Resources</p> <p>Vance, R. "Inroads: Making a Difference with SIDS... Sudden Infant Death Syndrome, " <i>JEMS</i>, 20(11):87, November 1995</p>

Teaching Outline	Notes
<p>Care of the Child With Special Health Care Needs</p> <p><u>Background</u></p> <ul style="list-style-type: none"> • Children with special health care needs are successfully living at home and attending school. • This group of children may or may not be dependent on medical technology. Some have conditions and needs that are recognizable at a glance; some do not. • Parents/caregivers are in most cases extremely knowledgeable about their child's condition, what is normal for that child and what is not. • EMS may be called if there is a problem with the child's equipment or technology. The call may be to the home or the school. • The Mass. Dept. of Public Health's goal is that every child dependent on technology have a well developed and coordinated Emergency Response Plan (ERP) in place. The ERP should include EMS, as well as primary and specialty care providers and school personnel if the child is old enough to attend school. • School nurses may contact EMS providers in their area regarding plans for children with special needs attending their school. • If there is no ERP in place, EMS providers can play a critical role in encouraging parents/caregivers to develop a plan with their primary care provider. • The most common emergencies are related to a critical airway (tracheostomy) or respirator dependence. <p><u>Management</u></p> <ul style="list-style-type: none"> • EMS should know about children with special needs living or attending school in their service area <u>before</u> an emergency occurs. Often children are in schools or daycare outside their home community. • Upon arrival, look to parent(s) or caregiver(s) for critical information about the child. • Be prepared to deal with the child's technology (e.g. a clogged trach tube) if necessary. • The appropriate point-of-entry hospital for the child may not be the closest hospital. • Does the child have a DNR order? 	<p>Teaching Tip</p> <p><i>The instructor should arrange to have portable equipment items available for students to look at (e.g. pediatric trach tubes).</i></p> <p><i>For assistance with this topic, contact the MASSTAR Program at MDPH, Div. for Children with Special Health Care Needs, (617) 624-5070.</i></p> <p>Other Resources</p> <p>Articles</p> <p><i>Palfrey, J. et al. "Prevalence or Medical Technology Assistance Among Children in Massachusetts in 1987 and 1990," Public Health Reports, March-April 1994.</i></p> <p><i>Newacheck, PW, and WR Taylor, "Childhood Chronic Illness: Prevalence, Severity, and Impact," American Journal of Public Health, March 1992.</i></p> <p><i>Wertz, EM, "The Special Needs Pediatric Patient," Emergency Medical Services, March 1993.</i></p> <p><i>SKIP - "Special Kids Information Program" Packet, New Hampshire EMSC Program. Includes written materials and slides. Contact NERA (address & tel.number above).</i></p> <p><i>"Children with Special Health Care Needs; Technology Assisted Children," 1998, Utah EMSC, EMSC Clearinghouse (703) 902-1203.</i></p>

Teaching Outline	Notes
<p>Emergency Care in the School Setting</p> <p><u>Background</u></p> <ul style="list-style-type: none"> • EMS can be called to a school if the nurse needs assistance or if the nurse is covering another school when the emergency occurs. • Other school personnel may or may not be trained in first aid and CPR. • School RNs are increasingly well trained in emergency care assessment. • School RNs are now equipped with epi-pens. • School RNs are developing emergency plans for their schools, which should include outreach to their EMS providers. • The potential for an emergency in the school has risen in recent years due to an increase in: <ul style="list-style-type: none"> -students with psychological emergencies; -students with substance abuse problems; -high risk pregnant teens; -students sent to school ill by working parents; -mainstreaming of children with special health care needs -children without a primary care provider; and -the ratio of the number of students / number of nurses <p><u>Management</u></p> <ul style="list-style-type: none"> • EMS providers should be encouraged to get to know school RNs and the emergency care resources available or unavailable to them. • EMS providers should have and be acquainted with a plan of the school layout. • There should be an awareness by EMS of high risk children enrolled in the schools, including children with special health care needs. • Be aware of any DNR orders. • When called to a school, make the school nurse a part of the EMS team effort. • Emergency readiness in schools is enhanced when EMS and school nurses are acquainted and collaborating. 	<p>Resources</p> <p><i>"The Comprehensive School Health Manual," Mass. Dept. of Public Health, School Health Program.</i></p> <p><i>For assistance with this topic, call the School Health Program, (617) 624-5477.</i></p>

CASE STUDIES

Child Abuse:

You are called to the home of a two-year-old male with a chief complaint of abdominal pain. When you arrive and assess the child, you see multiple bruises on the lower abdomen. How does your assessment progress?

- Check the chest, limbs, head and posterior surface for related injuries.
- Observe for abdominal distention.
- Request history of vomiting, character of pain, onset of symptoms.
- Quickly check the genitalia and perirectal area for signs of bruising or frank blood.

As you complete your assessment, the parent changes their mind about the need for EMS and refuses to allow you to transport the child to the hospital.

What do you suspect is the cause of this child's problem? How do you handle the parent's refusal of transport?

- Suspect the possibility of maltreatment.
- Enlist the help of local law enforcement.
- Stand by until police have dealt with the family.
- Transport to ED.

What history do you think is important to give the ED staff? How should this case be reported and to which authorities?

- Stress your physical assessment findings, as well as all interactions with the family.
- EMS personnel are mandated reporters of all cases of suspected child abuse, know your local laws and agencies.

SIDS:

You are called to the home of a three-month-old female, who was found to be in full cardiorespiratory arrest when the mother checked on the baby upon waking up this morning. The infant has cool pale skin, pooling of blood in dependent body parts, and dry eyes and oral mucosa. Mother is visibly upset, shaking and crying. What is your first priority?

- Initiate PALS guidelines for infant resuscitation.
- Assign one person to explain procedures to parent and obtain further history.

When the infant is pronounced dead, which individuals or agencies should be notified?

- Notify the medical examiner's office for all deaths in the field.
- Notify your local or national SIDS Center for parental support.

Bronchiolitis:

You are called to the home of a five-month-old boy with a complaint of respiratory distress. On arrival, you find an infant with a runny nose and fever. What are your assessment priorities?

- Assess airway patency.
- Assess degree of distress while breathing.
- Identify the signs of respiratory distress in a baby of this age. (Provider should include at least three of the following: wheezing, retractions, flaring, head bobbing, cough or tachypnea.)

During your assessment you note the presence of loud coarse and wet expiratory wheezing heard over all lung fields, copious nasal secretions, mild tachypnea, and mild intercostal retractions. What are your management priorities?

- Clear the airway by gentle suctioning if indicated.
- Provide humidified oxygen.
- Allow child to remain in parent's arms.
- Treat with nebulized Albuterol if indicated by medical control.
- Transport to care facility.

Febrile Seizures:

A 911 call is received with the information given that a 22-month-old male child is "twitching" and is blue. You arrive at the home of the child and are greeted by the anxious parents. They do not own a thermometer but noticed that he seemed to be "burning up" before his episode. They tell you that their child was diagnosed with an ear infection by their PMD earlier in the day. What are your findings on assessment?

- ABC's: The child has shallow respirations but is slightly cyanotic. CRT is 2-3 sec.
- LOC: The child is lethargic, does not appear to recognize parents, does not cry when examined.
- Vital signs: Rectal Temp: 39.5 (C); HR: 130; RR: 24, shallow; BP: 105/P
- PMH: as above, no recent head trauma, never hospitalized, no other significant history.
- Medications: started amoxicillin today, only 1 dose so far.

As you are completing your assessment, the child starts "twitching," a generalized seizure lasting approx. 1-2 minutes. What do you suspect is the diagnosis? Febrile Seizures. What are your management priorities?

- Position patient for safety
- Open airway
- Administer 100% FIO2
- Establish access and administer drugs per medical control
- Cool patient
- Support and inform parents
- Transport to ED

Cardiovascular Emergencies:

You are dispatched to a home for a 911 call. The anxious parents report that their 2-week-old baby looks blue. The mother also states that when she was changing the infant's clothing, she noticed that his heart felt like it was beating "really fast." She tells you that the baby has seemed a little irritable all day and hasn't fed well for her. What are your assessment priorities?

- ABCs: Airway is patent, appears slightly tachypneic and cyanotic; perfusion is poor; CRT is 4-5 sec.
- LOC: Irritable, slightly lethargic
- Vital signs: HR is too high to get accurate apical pulse; rate on C-R monitor is 230; RR: 70; BP: 75/P; afebrile
- PMH: benign; normal delivery; no recent illnesses
- Medications: baby vitamins

What is the most likely diagnosis? SVT. How will you manage this patient?

- Position baby to maintain open airway
- Administer 100% FIO₂
- Establish access, using IO if necessary
- Adenosine per medical control (is this within scope of practice?)
- Synchronized cardioversion per medical control (is this within scope of practice?)
- Support and inform the parents
- Transport immediately to ED

Pediatric Trauma:

You are called to the scene of a 5-year-old child who was riding a bike and was struck by a car going approx. 35 miles per hour. The child was thrown 15 feet and is supine on the side of the road. What are your priorities?

Remember the ABCs of trauma care:

- Open the airway with C-spine precautions
- Support ventilation as needed
- Intubate if necessary
- Get IV access

You evaluate the child; the initial GCS is 4, and you intubate without difficulty. During transport you are having increasing trouble with ventilation. What are your next steps?

Go back to your ABCs:

- If airway is patent, evaluate tube placement making a notation marking at the lip line.
- Check O₂ source

Sepsis:

You are called to the home of a 12-month-old child. The mother states that the child has been sick for the past 4 days. There has been a decrease in intake, and the child has not had a wet diaper for 14 hours. The child is ill appearing. Eyes are sunken, the child is limp, skin turgor is poor. What are your treatment priorities?

ABCs:

- 100% O₂ to assist respiration as needed
- Administer IV fluids: 20 cc/kg
- Get history of any other illness in the family

Upper Airway Obstruction:

A 3-year-old is choking on food. On your arrival, she is anxious, drooling and sitting forward. How would you intervene?

- Assess patency of airway, breath sounds and adequacy of ventilation.
- Check vital signs, including pulse ox.
- Obtain more history.

There is audible stridor with poor air entry bilaterally. Pulse ox is 88% and HR 130. She was eating when symptoms suddenly developed. What should you do now?

- Allow the child to remain with mother and supply supplemental oxygen.

As she is being moved to the stretcher, she becomes silent though still appears to be choking vigorously. She quickly becomes gray and unresponsive. What is your next move?

- Assess patency of airway, breath sounds and heart rate.
- Reposition the head and attempt BVM ventilation. If there is no improvement after several attempts, perform direct laryngoscopy and attempt to remove foreign body under direct visualization.

A piece of hot dog is successfully removed, and the child's condition improves. Transport.

Upper Airway Obstruction:

A 10-month-old has developed cough and noisy breathing over the last several hours. On your arrival, he is anxious and appears to be in respiratory distress. How would you proceed?

- Assess vital signs, including respiratory rate, heart and pulse oximetry.
- Assess work of breathing.
- Obtain more history.

The respiratory rate is 40, there are severe retractions. Air entry is poor. HR is 140, and pulse ox does not pick up. He has had some nasal congestion for the past several days and has developed a low grade fever today. Cough and respiratory distress developed in the afternoon and has worsened this evening. What interventions should you provide?

- Give humidified oxygen.
- Deliver racemic epinephrine by aerosol.
- Maintain child in a position of comfort.
- Reassess and transport.

Cardiopulmonary Arrest:

You are called for a 4-month-old infant who is gasping and cannot be aroused. On your arrival, the child is apneic and pulseless. What is your next step?

- Open the airway and begin BVM with 100% oxygen. Begin CPR.
- Prepare to intubate with 3.5 +/- 0.5 ET tube. Assess tube placement.
- Ventilate at 50-60 bpm with 100% oxygen.
- Continue CPR and assess adequacy of compression.

There is now a HR of 40 on the monitor with absent distal pulses.

- Establish vascular access with IO.
- Epinephrine 1:10,000 0.1 cc/kg IO. May give ET if cannot secure IO.
- Assess breath sounds, pulse oximetry, heart rate and pulses.

Heart rate is 110 with thready distal pulses. Pulse ox does not pick up. Breath sounds are equal bilaterally with good chest wall excursion.

- May give 10-20 cc/kg bolus of normal saline, check dextrostick and transport.

Cardiopulmonary Arrest:

You are called to the scene of a 7-year-old asthmatic in severe respiratory distress. On your arrival, he is apneic with a pulse of 30. What do you do next?

- Establish an airway and begin bag-valve-mask ventilation. Begin CPR.
- Assess adequacy of ventilation and check for pulse with CPR.

There is poor air entry bilaterally, and there is a pulse with compressions.

- Prepare to intubate. ET tube size = $\frac{\text{age in years} + 16}{4}$
- Establish IV access.
- Which drugs might be helpful? sedation, atropine, muscle relaxant.

The child is intubated after sedation with midazolam. Tube position, breath sounds, pulse ox and pulse are assessed. Breath sounds are equal. Diffuse wheezes are heard. Pulse ox is 80%, and heart rate is 80. Now what?

- Administer subcutaneous epinephrine and albuterol aerosol via ET tube.
- Transport

Integrated Learning Experiences

Skills Lab	Practice pediatric airway management Practice intraosseous infusions Practice pediatric case scenarios to include: Foreign body obstruction Croup/epiglottitis Cardiopulmonary arrest Pediatric trauma
Hospital	Practice intubations in the cat lab Perform intraosseous infusions in the ED Assist in assessment and management of pediatric emergencies in ED Take all pediatric vital signs in the pediatric ICU or ED
Field Internship	Assist in assessment and management of pediatric emergencies in field

General References

American Heart Association, *Textbook of Pediatric Advanced Life Support.*, Dallas, TX, 1988.

APLS (Hopkins), *Practical Guide to Pediatric Intensive Care*, 3rd ed. (Blumer)

Eichelberger, MR: *Pediatric Emergencies*, Englewood Cliffs, NJ, Prentice Hall, 1992.

Video - *Street Medicine - Pediatric Emergencies*.